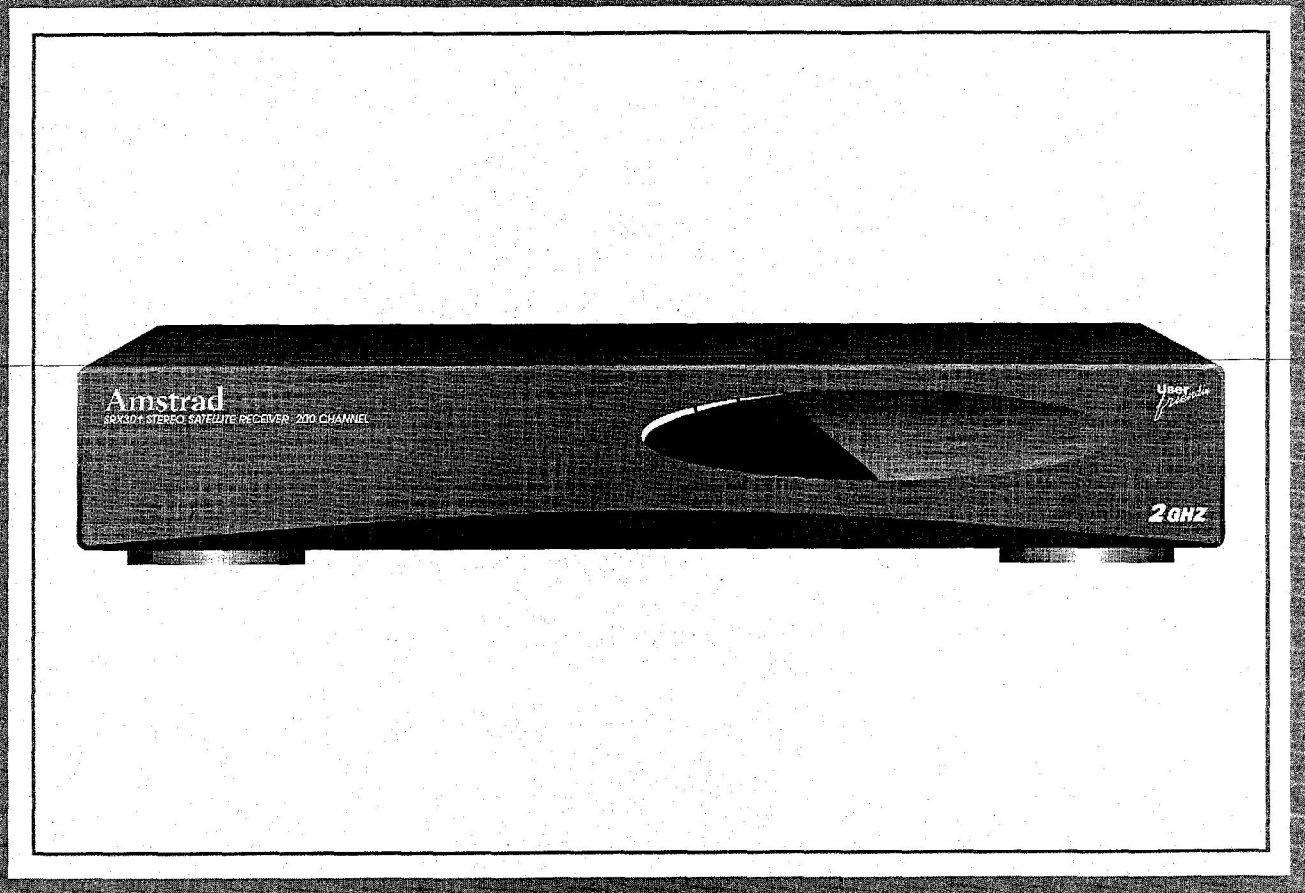
Amstrad



SRX301

SATELLITEN-EMPFANGSANLAGE
SATELLITE RECEIVER

SERVICE HANDBUCH
SERVICE MANUAL

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Date of first publication November, 95

Amstrad reserves the right to supply selective components.
Information published was the latest available at the time of print

Technical Specifications

Receiver:

Dimensions:	335x250x62mm
Weight:	2.2kg
Mains Supply:	230-240V 50Hz
Channel Bandwidth:	27MHz
Dynamic Range:	-60dBm to -20dBm
Threshold (Static):	6dB C/N Typ.
RF Output:	Channel 38 (Adj. 30-40)
Audio Sub carrier:	5.5-8.5MHz
Audio Output Level:	2V P-P @ 50kHz Deviation
Audio Response:	40Hz-10kHz
I/O Connectors:	LNB 75Ohm F-Type RF 75 Ohm Coaxial x2 Scart/Peritel 21 Way

LNB:

Input Frequency Range:	10.70-11.8GHz
Output Frequency Range:	950-2050MHz
Local Oscillator:	9.75GHz
Gain:	55dB
Noise Figure:	1.2dB Typical
Polarisation Switching:	Electrical (13-17V)
Output Connector:	75 Ohm F-Type

SAFETY TESTS

Please note: When any work is carried out on this product, the following safety tests must be carried out to ensure continued safety.

1) Flash test from the mains lead with live and neutral joined together to all accessible external metal points at 3kV.

2) Megger test at 500V DC from the mains lead with live and neutral joined together to all accessible metal points reading must not fall below 4 M Ohms.

In keeping with our policy of continually improving our service and technical quality of our products, we reserve the right to change type, manufacturers, sources of supply or technical specifications at any time.

Amstrad plc
Brentwood House,169 Kings Road, Brentwood Essex CM14 4EF

Equipment Required:

A video source, typically 1V p-p into 75Ω. e.g. a VCR output or the scart video output of a second satellite receiver.
Oscilloscope and x10 probe, (scope b/w at least 20MHz).
Digital Multimeter or equivalent.
A 39R, 10W load resistor.
A Scart lead terminated with flying wires.
A suitable remote control unit fitted with good batteries.
A Colour TV with scart input.
A means of listening to stereo audio, e.g. audio amp and headphones.
A 9.75GHz (or 10GHz) satellite dish, ready aligned to the Astra Satellite.

Fault index:

The service tests are arranged in a suitable order for rapid fault location.
The index below can be used by locating a fault listed below, and then performing the series of tests in the order shown. (The list is for guidance only and is not exhaustive).

Fault Description.	Section
Suggested Test Order.	
Unit dead, LED off, blown fuse.	1,2,5
Decoder scart fault	3
No OSD on overlay	3,4,6,8
No OSD ever	8
No video on tuner output.	10,14,15
Sound is distorted.	16
Sound tuning drifts with time.	1,16
Stereo mode, not operational	16
Sound is dull or tinny.	16,17
Audio tuning not working	1,11,12,18
Either No Horizontal or No Vertical Channels.	9
Poor Picture	13-15
Remote control doesn't work.	7

Preparing Unit for test.

a) Unplug the unit from the mains. Disconnect all other leads including the LNB.
b) Remove all screws from top lid:- Two screws each side, three screws top rear, two recessed on underside. (Note: Screw fitted nearest the mains flex is Threaded, all others are self-tappers).
Carefully remove the top lid.

WARNING!
The hatched PSU area, (including the heatsink), are at High potential.
During certain PSU faults, C605 may remain charged at 300V for several minutes after power disconnection.

Preliminary checks.

a) With the lid off, check that the PSU is properly connected to the main PCB (PL5 of main PCB).
b) Check that the two VideoCrypt PCB leads are properly connected.
b) If IC1 (micro) is socketed, check that the micro is correctly seated.

Part A - Main PCB and PSU PCB tests.

1) Checks all DC Voltage rails on main PCB.

a) Apply mains power to unit. Led should go red.

b) Connect the -ve lead of a voltmeter to the tuner's metal mounting bracket (0V) or to any of the PCB links silk-screened 0V. (Note: this test relies on a good 0V link between the PSU and main PCBs).

c) Measure the DC voltage on the silk-screen link marked "+5VV" (found next to PL5).

i. If it is +5V +/- 0.25V Pass to test 1d), else continue.

ii. If the DC voltage on D607's cathode, (D607 is found below D611 on PSU PCB), is +5V +/- 0.5V (+6V off load). Pass to test 1d) else continue.

iii. With power off, check for good continuity between D607 cathode and the +5VV link on the main PCB.

d) Measure the DC voltage on the silk-screen link marked "+12V" (found next to PL5).

i. If it is +12.5V +/- 0.5V Pass to test 1e), else continue.

ii. If the DC voltage on D611's cathode is +12V +/- 0.5V Pass to test 1e), else continue (up to +16V off load).

iii. With power off, check for good continuity between the +12V link on main PCB and pin3 IC603 (12V Regulator). Check for good continuity between D11 cathode and pin1 IC603.

e) Measure the DC voltage on the silk-screen link marked "+28V" (found next to PL2).

i. If it is +29V +/- 2V Pass to test 1f), if not continue.

ii. If the DC voltage on D609's cathode (PSU) is +30V +/- 3V Pass to test 1f), if not continue (up to +37V off load).

iii. With power off, check for good continuity between D609 cathode and the +28V link

f) Measure the DC tuning reference voltage at TP2 (found next to IC6).

i. Should be +9V +/- 0.25V.

g) Carefully measure the following DC voltages on the tuner PCB. (NB: PL1a pin 1 is closest to the rear panel, also note that the tuner pin functions are silk-screen labelled on the main PCB).

PL1a pin 2	+4.7 to +5.0V DC
PL1b pin 12	+11.5 to +12.5V DC

2) All DC voltage rails are dead.

a) REMOVE the mains power from unit.

b) Inspect the fuse fitted to the PSU PCB. If blown replace with an identically rated fuse. Re-apply power. If the fuse blows go on to test 2c .If the fuse does not blow, recheck DC Voltage section 1 above.

c) Top switch test: Disconnect mains from the unit. Remove the two screws that hold the PSU PCB in place. Locate the top switch (IC604). Inspect the topswitch body; if it looks chipped, cratered or burnt replace and repeat the fuse check. Check for short circuits between pins and tab on IC604. See Transistor pin configuration diagram.

3) Main PCB Video chain test. (PSU must be working, Tuner is either working or non-working)

a) Unit should be in standby. Apply a 1V p-p Video signal to the video input of the decoder scart socket. i.e. 1Vpp video to Pin 20 of SK2 and 0V to pin 17.

b) Connect pin 8 of SK2 to a DC voltage between 10V and 15V. Check IC4,9 is > 9V dc.

With a scope...

c) Check at IC4 pin 3: Video signal to be 2Vp-p with about 7V DC offset to sync tip.

d) Check at IC4 pin 4: Video signal to the same as c) above.

e) Check at TR14 emitter: Video signal to be 2V p-p with about 6.5V DC offset.

f) Check at TR20 emitter: Video signal to be 1V p-p sync-tip clamped to about 1.2V DC offset. Ensure that as the video picture content changes, the video waveform remains fixed at a constant DC offset. (i.e. should be sync-tip clamped to about 1.2V).

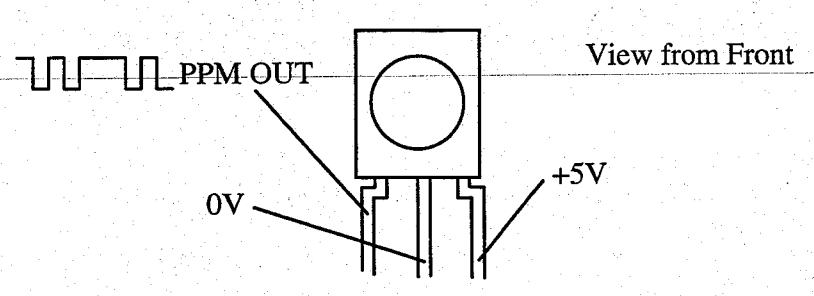
g) Check at IC3 pin 5: Video signal to be 2Vp-p with a 1.2V DC offset.
h) Check at IC3 pin 9: To be < 0.5V.
i) Check at SK3 (TV Scart) pin 19: Video signal to be about 2Vp-p with a 0.8V DC offset. (If SK3 is 75Ω terminated then video signal will be about 1V p-p with a 0.4V DC offset.
j) Check TP3 (RF Modulator Video): Video signal to be 0.8Vp-p with a 0.3V DC offset.

4) Sync separator: With a scope...
a) Check at junction of R69 & C34: If video test signal contains chroma info, check that the chroma video has been filtered-out at this point.
b) Check IC3 pins 10 and 11: To be > +4V DC.
c) Check TR13 Collector: Observe H Sync pulses with 0 to +12V (Scope Photo:4c)
d) Check TR12 Collector: Observe H Sync pulses similar to test (c) above, but inverted
e) Check at IC3 pin 13: inverted H Sync pulses between 0 and 5V (Scope Photo:4e)
f) Check IC1 pin 21: Observe the same waveform as (e) above.
g) Check TR10 Base: Observe +6V +/- 0.5V DC
h) Check at TR10 Collector: Observe Vsync pulse between 0 and +5V. (Scope Photo:4h)
i) Check at IC3 pin 1: Observe same waveform as (h) above.
j) Check at IC3 pin 15: Observe same waveform as (h) above.
k) Check IC1 pin 22: Observe same waveform as (h) above.

5) Check Microcontroller operation.
a) Disconnect the LNB. Remove any connection to decoder scart.
b) Press STANDBY on the remote (or use the front panel button). If the LED goes immediately from red to green then the micro is probably OK.
c) Check the 4MHz crystal oscillator: Check that IC1 pin 7 is an approximate 4MHz sinusoid with an amplitude of about 100mV p-p.

6) Check Vsync detect input to micro
a) Disconnect the scart from SK2 Decoder Scart input
b) Check IC1 pin 6 with scope: Vsync to mainly +5V with some random low noise pulses.

7) Infrared Circuit and front panel buttons
Note: Before continuing, ensure you are using the correct remote control, that it works and that the batteries are in good order.
a) Set a scope to 1V div, 1ms/div. Point the Remote Control Handset towards the IR sensor, press any key and observe a pulse waveform on IC1, pin 5 between about 0V and +5V. If no signal, remove Front panel PCB (remove one screw). Check each pin of the sensor as below.



b) Check IC1 pin 15 (CHU): The voltage drops to 0V while Ch. UP button is pressed
c) Check IC1 pin 16 (CHD): The voltage drops to 0V while Ch. DOWN button is pressed
d) If the remote works, but operational range is < 5 metres, try replacing the sensor found on a small PCB attached to the front panel.

8) Check On Screen Display (OSD)

a) Connect a Colour TV to the TV scart of the satellite receiver, disconnect any LNB

b) Press the Timer key on the remote (clock symbol).

c) The background should go black, observe a flashing date.

d) Check the following for micro generated Hsync waveform between 0 and +5V:-

(i) IC1,36 Scope Photo:9d

(ii) IC3,15

(iii) IC1,21

e) Check the following for micro generated (inverted) Vsync between 0 and +5V:-

(i) IC1,35

(ii) IC3,5

(iii) IC1,22

f) Check TR4 collector with scope: Waveform output is < 0.5V DC.

g) Check OSD oscillator on IC1 pins 19 & 20: Should be an approximate 5.5MHz sinusoid with an amplitude between 4V and 5V.

Press Cancel, after OSD channel timeout, observe noise on TV display.

9) Check LNB power supply

(a) Check LNB Voltages with NO load.

(i) Enter VIDEO tuning menu (TV symbol on remote).

(ii) Connect the black lead of a DVM to 0V (e.g. tuner bracket), connect red lead to F connector centre, (e.g.carefully poke some wire into the LNB socket to make the connection).

(iii) Change polarisation to V, the meter should read between 13V and 14V.

(iv) Change polarisation to H, the meter should read between 17V and 18V.

(b) Check and adjust LNB Voltages with Load.

(i) Enter SETUP menu, change TONE to OFF.

(ii) Connect a 39R 10W load to the F connector. Connect a DVM across the load.

(iii) Set Video tune menu to 'V'. Adjust RV600 on the PSU PCB to give 18.0V on DVM.

(iv) Set Video tune menu to 'H'. Check that DVM reads between 12.8 and 14V.

(c) LNB Supply Dead, No Voltage:-

(i) Check IC1 pin 31: When display is V, pin is < 0.5V.
When display is H, pin is > 3.5V.

(ii) Check PL5 pin 6: When display is V, pin is between 1.1V and 1.2V.
When display is H, pin about 0V.

(d) 22KHz Tone check:

(i) Connect a 39R 10W load to the F connector.

(ii) Connect an ac coupled scope, 0.2V/div, 20uS/div, across the load.

(iii) In SETUP menu, change Tone to ON.

(iv) When Tone ON, observe Squarewave on scope between 0.4 and 0.6Vpp, with a period of about 50uS and with a roughly equal mark/space ratio.

(v) Change Tone to OFF, scope should display < 10mVpp of PSU noise.

e) Short circuit the F connector, (this will not damage the unit), check that the front panel LED flashes red on/off. Remove short and unit should recover.

10) Tuner Check

a) Ensure that tests (1) and (9) have been performed before continuing.
b) In SETUP menu, set options to NARROW, 9.75MHz LNB.
c) Connect the LNB to the F connector.
d) Connect a Colour TV via the satellite unit's TV scart (scart nearest power cord).
e) In the picture tune menu, perform a tuning scan
f) If the tuner is working, the tuning bar should increase, the frequency display should increase. When a channel is detected, the tuning should stop and a picture should be displayed.
g) On Tuner PCB, monitor PL3,3 (AFC) with a scope As a Video picture is tuned in, the AFC voltage should vary between 0V and 3V dc. When the picture is locked, the AFC Voltage remains static at about 1.5V dc.

11) Audio tuning check

a) Connect a voltmeter to PL1b, 11 (VTA) of the tuner.
b) Enter the Sound tune menu. (Speaker symbol on remote).
c) Press NEXT several times until the bar at the bottom of the screen flashes.
d) Use Chan up and down keys to alter bar length. The DC voltage should vary between 0V (minimum bar) to about +9V (maximum bar).
e) Press CANCEL to leave menu.

12) Test IIC lines.

The Eeprom data and Video Tuning are controlled via the IIc line. The IIc line can be tested as follows:-

a) Set scope to dc, 5ms/div, 1V/div. With unit in standby, check with scope that IC2, 5 (SDA) is about +5V. Turn unit On, observe a 10mS, 0V pulse burst. Line should then sit at about +5V.
Repeat test for Tuner PL1a, 3 (SDA).
b) Check IC2, 6 (SCL) as above. Observe similar waveform as above.
Repeat test for Tuner PL1a, 4 (SCL).
c) Ensure that supply to IC2 is correct:- pin 8 is +5V, pins 1,2,3,4 are 0V.
d) Check PL3,1 on Tuner PCB (4MHz IN). Should be about 0.2Vp-p amplitude.

Part B - Tuner PCB Tests

The tuner module is almost exclusively built with surface mount components and so offers little scope for repair. However, some limited testing can done, and in some cases a fault may be corrected. A special surface mount soldering-iron will be required for any repair undertaken.
Never remove the lid from the tuner can, any repair inside requires access to specialised test equipment.

Refer later in this manual for the tuner module component layout. There are five preset pots on the tuner module, these have been factory aligned and should therefore not normally need to be re-adjusted. Only RV1 offers straightforward adjustment, all others should only be adjusted as a last resort.

The pots are listed below:-

RV1	Video level adjust.
RV3	10.70MHz (left) centre demod adjust.
RV4	Noise reduction left set.
RV5	10.52MHz (right) centre demod adjust.
RV6	Noise reduction right set.

13) Later tuners have an AFC pot adjustment accessible from a hole in the can. If this pot is not fitted please IGNORE the set-up procedure outlined below.

To check AFC pot setting:-

i) Select a channel, check that the displayed frequency agrees with the published channel frequency.

ii) Within the video tuning menu, select the tuning bar and tune scan-up. When tuning stops at a channel, note down the frequency display. If this frequency is within 1MHz there is no need to re-adjust RV2.

iii) If frequency is more than 1MHz out, repeat (i) above, then continue below.

iv) Connect a DVM to PL3 pin 3 of the tuner (AFC) - You may have to remove the sponge support pad.

v) Adjust pot to give a reading of 1.50V dc.

vi) Verify adjustment by repeating (ii) above. The discrepancy should now be less than 1MHz.

14). Video testing and adjustment - Visible Video display.

If a video output is present but the picture quality is poor, (and it is not due to a badly aligned dish), the video chain can be tested as follows:-

a) Plug an LNB into the unit. Select an Astra channel with a fairly static picture, e.g. a test card or newsreader.

b) Check that the tuner module is powered up with the correct DC voltages - See test (1) earlier.

c) Enter the SETUP menu, set deviation to Narrow.

d) Check the signal side of RV1, should be 150mV DC level with about 50mVp-p of video. The signal also contains audio subcarriers so will not resemble standard video but will be similar to Scope Photo: 13d.

e) Check for a similar signal on RV1 centre. Adjust RV1 and observe on scope some variation in video amplitude, set RV1 for maximum video amplitude.

f) Check TR8 emitter: 1.8V DC level, about 500mV p-p of video.

g) Check PL2, pin 3: observe a 6.8V DC level, with about 1.5V p-p video.

h) Check TR16,base: about 3.6V DC level, about 2.5V p-p video.

i) Check IC4, pin 3: result as test (h) above.

j) Check IC4, pin 4: result as test (h) above.

k) Measure pin 19 of unterminated TV scart. Set RV1 on tuner PCB to give 2V p-p video (DClevel about 0.6V).

l) Return SETUP to original customer settings.

15) Fault finding the Video chain.

If there is no video output, the video chain can checked by examining both the DC offset and noise amplitude at various stages. Perform the following scope measurements:-

a) Check that Tuner is powered with correct DC voltages - see test (1) earlier.

b) Unplug the LNB from the unit. Enter the SETUP and set to Narrow.

c) Adjust RV1, observe noise amplitude and DC level variation, then set for maximum noise level. Noise signal should be about 0.5Vp-p on about 1.7V DC level.

d) Check TR8 emitter: 2V DC level, about 0.5V p-p of noise.

f) Check PL2, pin 3: 7.7V DC level, about 1V p-p of noise.

g) Check TR16, base: 4.5V DC level, about 2V p-p of noise.

h) Check IC4 pin 3: 4.7V DC level, about 2V p-p of noise.

i) Repeat test h) with deviation set to wide, DC level drops to about 4.2V and noise amplitude to be about 1.4Vp-p. Return to narrow.

j) Check that IC4 pin 4 is the same as IC4 pin 3.

k) Return SETUP to original customer settings.

16a) Audio demod centre adjustment (without a frequency counter)

Note: If a frequency counter is not available, the audio demod centres can be very roughly set-up as explained below, however this method will not be as accurate as method 16ii) or 16iii) below.

i) Unplug the LNB.

ii) Enter the audio mode and set to Mono, (tuning bar setting unimportant), Store settings, wait for OSD channel number to clear.
iii) Listen with headphones to the stereo output of the decoder scart.
iv) As accurately as possible, adjust RV3 such that it is positioned exactly half-way between the edges of the band of loud white noise. This roughly sets up the 10.70MHz centre.
v) Reconnect LNB. Select a channel with a known stereo audio track. e.g. MTV.
vi) While still in mono, adjust the audio tuning bar for best sound.
vii) Set to stereo, store settings.
viii) As accurately as possible, adjust RV5 such that it is positioned half-way between the edges of the undistorted audio band. This roughly sets up the 10.52MHz centre.
ix) Check the stereo audio on other channels. Should hear no distortion, pops or crackles and no sibilance on speech.
x) If possible, heat the tuner module with a hairdryer and ensure that the stereo audio remains in tune, if not repeat the process until the audio tuning remains stable.

16b) Audio demod centre adjustment (with a frequency counter and oscilloscope probe)

Note: Correct Set-up of Audio demod centre requires a frequency counter, this method will not be as accurate as method 16iii below.
i) Temporarily short-out L9 on tuner PCB. Unplug the LNB.
ii) Connect a x10 scope probe, to the counter input.
iii) Measure the frequency at TP5. Adjust RV3 to give a reading of 10.60 MHz (note that this value assumes that a x10 probe will pull the frequency by about -100kHz. If you obtain a reading greater than 18MHz the counter is reading the second harmonic, in this case adjust RV3 for a reading as close to 21.20MHz, (adjusting to the second harmonic reading is still valid).
iv) Measure the frequency at TP6. Adjust RV5 to give a reading to 10.42 MHz. If you obtain a reading greater than 18MHz, adjust RV5 for a reading of 20.84 MHz.
v) Remove short to L9.

16c) Audio demod centre adjustment (with a frequency counter and special Hi-impedance probe)

Note: This method centre requires a frequency counter and a special home-made probe.
i) Build the probe described in Appendix A..
ii) Temporarily short-out L9 on tuner PCB. Unplug the LNB.
iii) Connect the probe built in (i) above to the counter input.
iv) Measure the frequency at TP5. Adjust RV3 to give a reading of 10.700 MHz (left channel)
v) Measure the frequency at TP6. Adjust RV5 to give a reading of 10.520 MHz (right channel)
vi) Remove short to L9.

17) Noise reduction test and set-up

Note: If the sound is distorted, sibilant or crackly, it is unlikely to be the noise reduction set-up but rather a fault with the audio demodulation (see test 16).
The noise reduction pots RV4 and RV6 are factory set and should not be adjusted. Any service adjustments that need to be made can only be done by ear as follows:-
Listen to stereo broadcast, ideally music. Adjust RV4 and RV6 to give best sound.

18) Audio chain testing

a) Select a channel with a good picture.
b) Perform test (11) to check the audio tuning voltage is correct.
c) Enter audio tune menu and set tuning bar about half-way.
d) The DC tuning voltage on PL1b, pin 11 to be about 2 to 4 Volts.
e) Check for the same tuning voltage on IC10, pin 7.
f) Check for subcarrier signal on IC5, pin 12 and same signal on IC5, pin 14.

g) With scope, check for an oscillation of between 15MHz and 20MHz at about 1.8V p-p on TP4. (Note: some counters may lock onto the second harmonic, if so the frequency readings will be double those stated above).

Receiver's main PCB circuit description.

(Refer to the Main PCB block diagram and circuit diagram).

The Microcontroller, IC1, forms the heart of the receiver's hardware performing the following tasks; OSD character generation, Infra-red and front panel switch decoding, Vsync and Hsync after hours sync generation, Vsync detection, Audio PWM tuning, Video IIc tuning control, IIc communication with the Eeprom, LNB short-circuit detection.

Video processing.

Video from tuner module goes to switch IC4. Pin 8 of decoder scart routes either tuner or decoder scart video to buffer TR14. Buffered video goes to both a sync separator and a sync tip clamp.
The sync tip clamp comprises of TR9,TR17 and TR20. Sync tip clamp level set by R73/R79.
IC3 is the OSD insert switch. Video blanking from the micro's blank output (IC1,26) controls OSD insertion via IC3,9. TR22 buffers the video before arriving at the TV scart.
The sync separator video is taken from TR14 emitter. R69/C34 remove chroma, TR13 strips Hsyncs which are inverted by TR12. TR10/TR11 strips Vsyncs from the Hsync. H and V go to IC3. IC3 (under control of pins 10/11), route either internal or external H and V to the micro's OSD clock (L1). When IC3 pins 10/11 are High, sync from the sync separator are routed to IC1, if Low then the micro generated H and V are routed.
The micro looks at the V pulses from the sync-stripper (Vsep). If there is no sync the micro generates VGen via IC1,37 (and TR27), if the micro detects valid sync, pin 37 remains at logic 1.
HGen and VGen provide after hours sync generation. VGen is detected by TR4/R93/C16, generating a Vsync Det signal at TR4 collector. When TR4 collector is High, internal sync is selected, when Low, internal sync is selected. While internal syncs are selected with Vsync Det , OSD blanking (black fringing) is turned off and Audio is muted.
TR16 is a sync summer, it generates after hours composite sync (at TR21 base) by summing HGen from TR19 collector and VGen from C45/R111.

Audio processing

Stereo Audio from the tuner module goes to switch IC4. Pin 8 of decoder scart routes either tuner or decoder scart stereo audio to buffers TR2 and TR3. R39 creates a mono blend for the RF modulator.

LED driver

R91 and C40 integrate the PWM at IC1,39 to a DC voltage between 0 and 5V while R68 limits the LED current.
If the Voltage across C40 if about 0V, TR7 is off and TR18 is on, the LED is Red
If the Voltage across C40 if about 2.5V, both TR7 and TR18 are off, the LED is off.
If the Voltage across C40 if about 5V, TR7 is on and TR18 is off, the LED is Green

LNB short-circuit detect

If LNB supply is working, the LNB s/c input detect pin of IC1,28 is at about +5V. If the LNB voltage falls below about +10V, the voltage at IC1,28 falls below +3V and the micro detects an LNB short-circuit.

D2 is off and IC1,28 is +5V. If the LNB supply is shorted and drops below about +4V, D2 goes on and IC1,28 becomes about 0V.

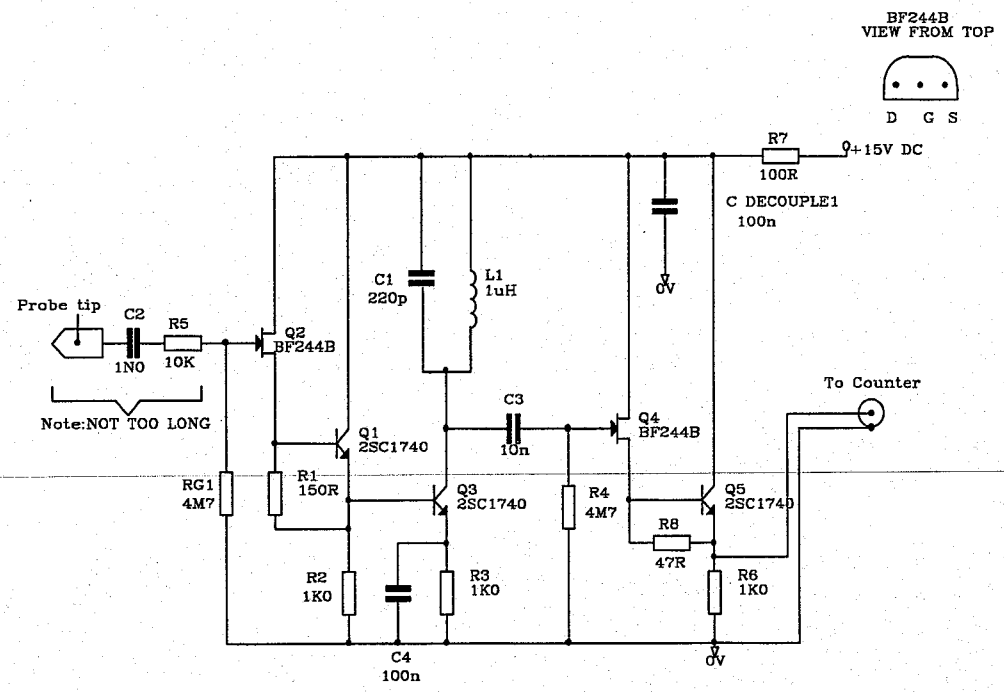
Video tuning IIC.

The micro controls the Video tuning by writing IIC tuning data to the tuner via the SCL and SDA clock and data lines.

Audio tuning PWM.

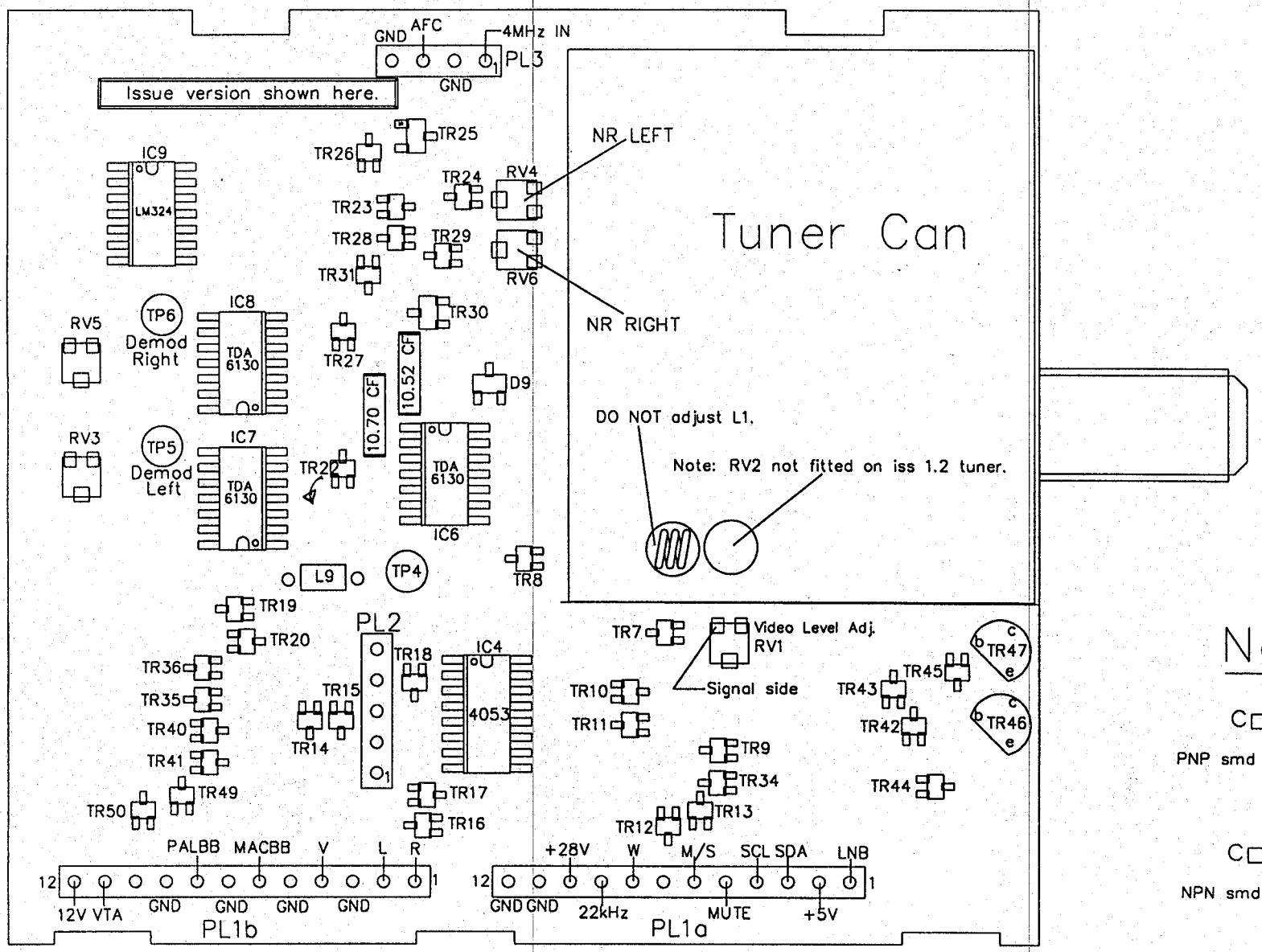
IC6,R107,R108 provide a +9V tuning reference voltage from the +28V supply. The audio tuning signal at IC1, pin 37 is an open-collector, 8-bit resolution, variable pulse-width waveform fixed at 15.625KHz.
The PWM waveform at IC1, pin 36 is integrated by R62,R23,C12,C19 generating a variable dc audio tuning voltage between 0V and +9V.

Appendix A - High impedance probe schematic.



Note:
All resistors are 1/4W 5% or better.
All capacitors are Ceramic 10% or better.
BC109 or BC182 transistors can be substituted for the 2SC1740.

Tuner Component Layout



Notes: –

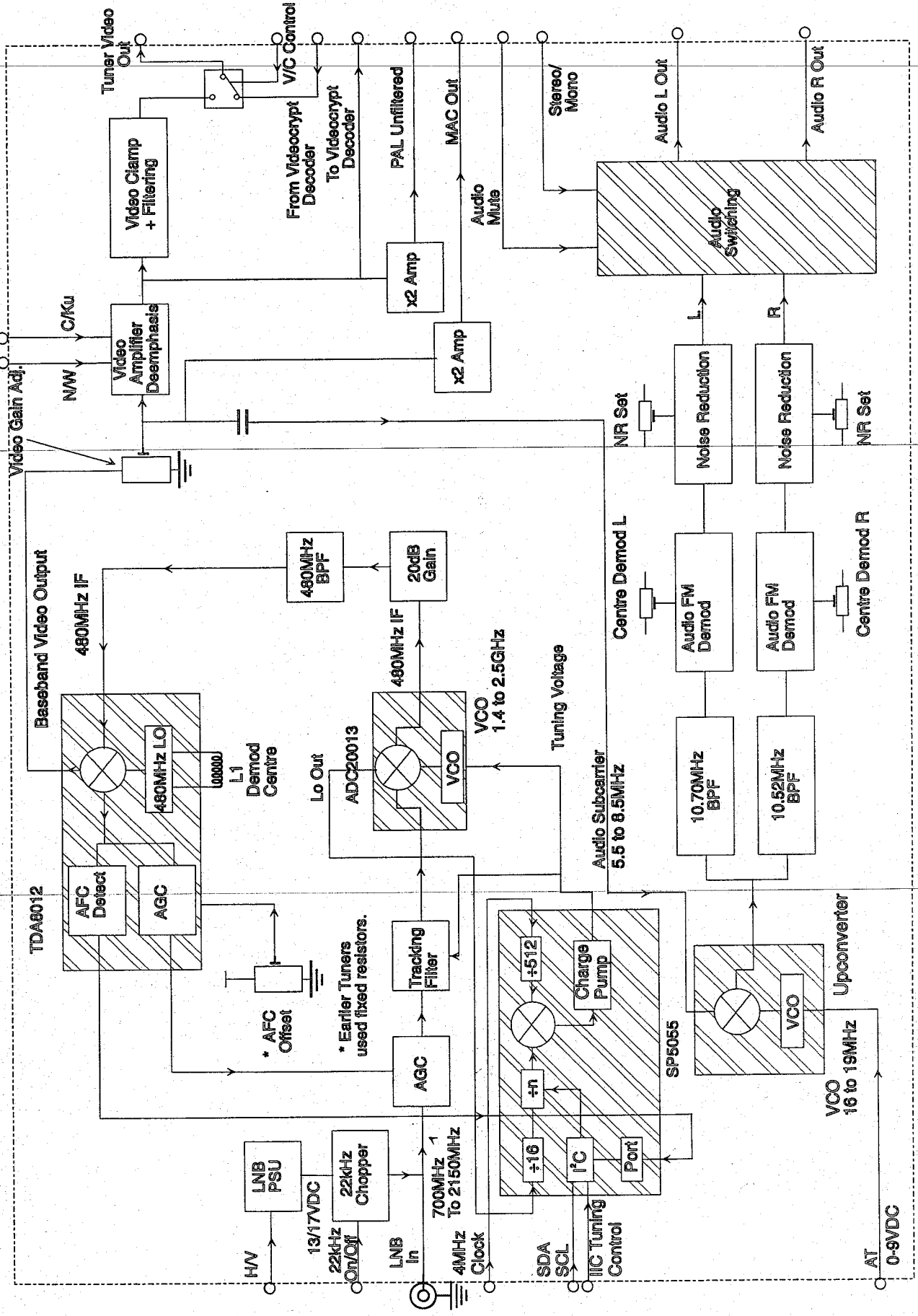
BC857

PNP smd usually marked 'FS'

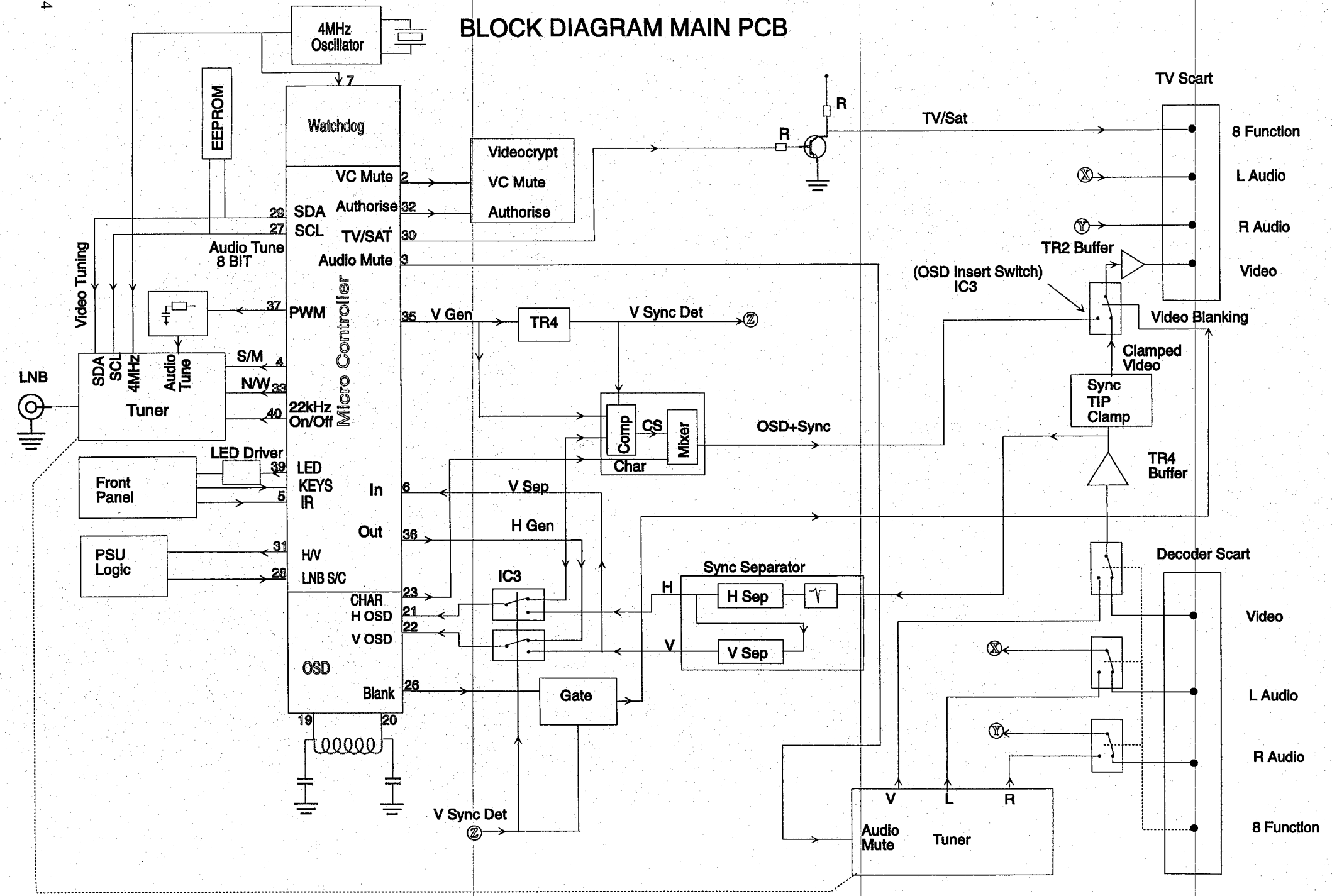
BC847

NPN smd usually marked 'BS'

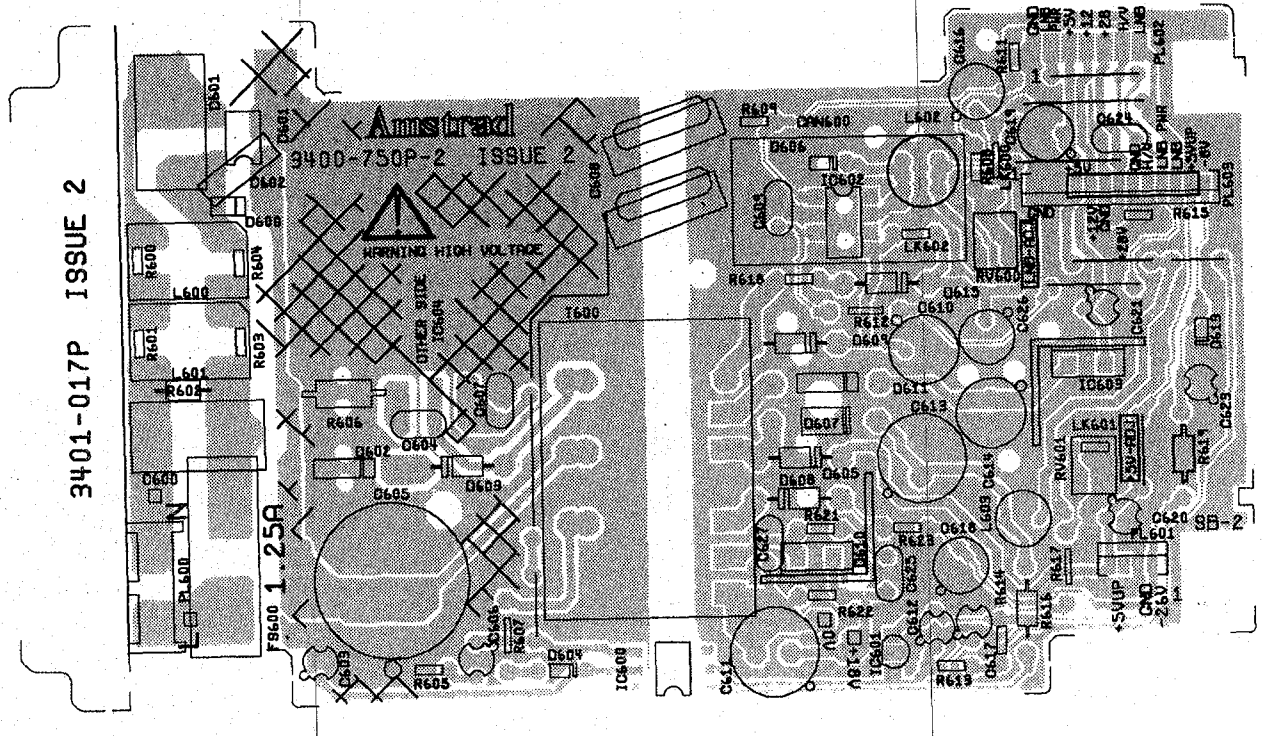
TUNER BLOCK DIAGRAM



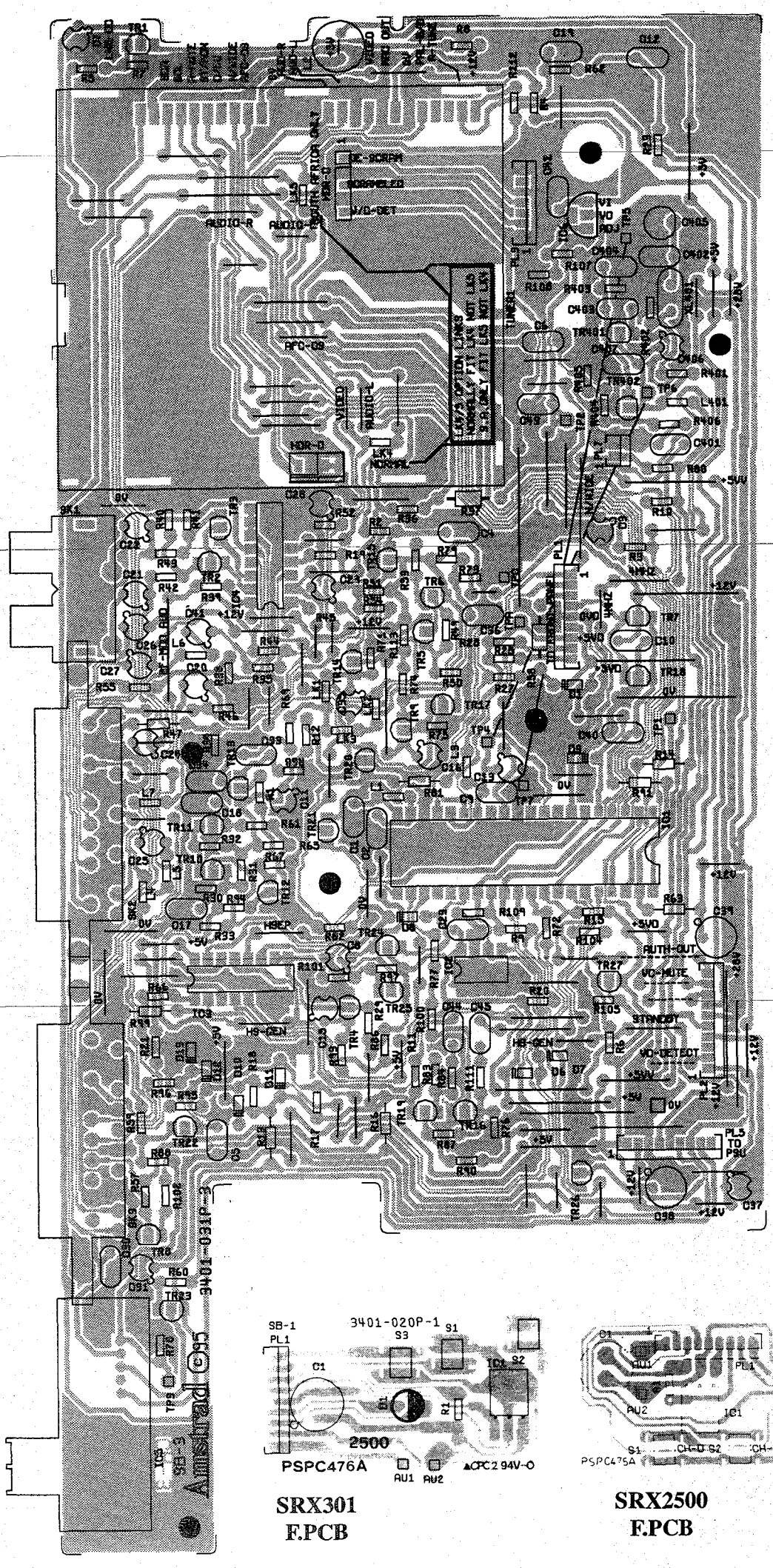
BLOCK DIAGRAM MAIN PCB



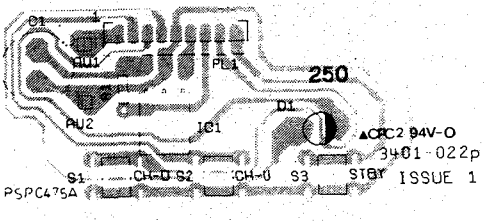
PSU PCB Component Layout



Main PCB Component Layout



SRX301
F.PCB



SRX2500
F.PCB

PSU Schematic Diagram

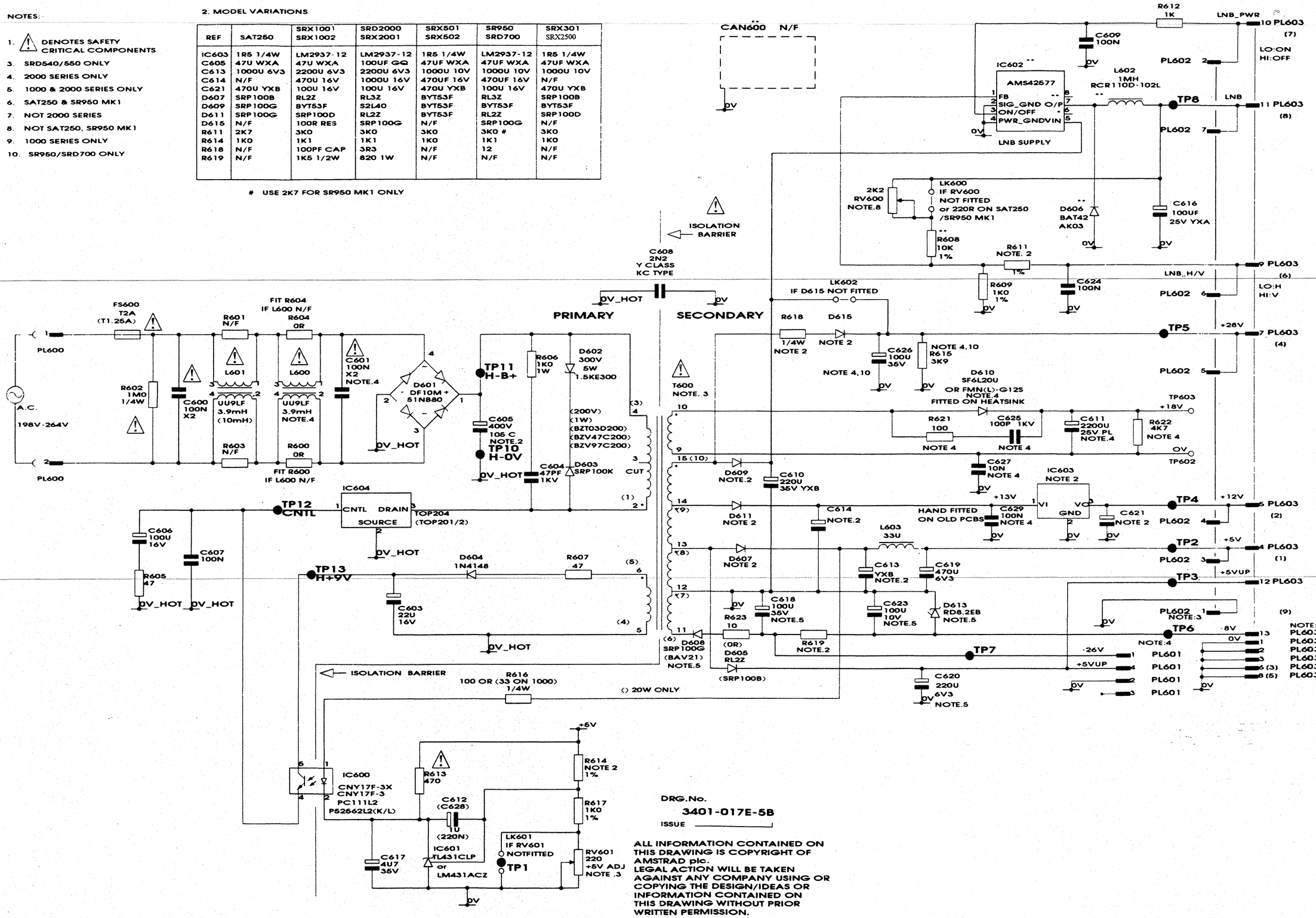
NOTES:

1. ⚠ DENOTES SAFETY CRITICAL COMPONENTS
3. SRD540/550 ONLY
4. 2000 SERIES ONLY
5. 1000 & 2000 SERIES ONLY
6. SAT250 & SR950 MK1
7. NOT 2000 SERIES
8. NOT SAT250, SR950 MK1
9. 1000 SERIES ONLY
10. SR950/SRD700 ONLY

2. MODEL VARIATIONS

REF	SAT250	SRX1001 SRX1002	SRD2000 SRX2001	SRX501 SRX502	SR950 SRD700	SRX301 SRX2500
IC603	1R5 1/4W	LM2937-12	LM2937-12	1R5 1/4W	LM2937-12	1R5 1/4W
C605	47U WXA	47U WXA	100UF GQ	47UF WXA	47UF WXA	47UF WXA
C613	1000U 6V3	2200U 6V3	2200U 6V3	1000U 10V	1000U 10V	1000U 10V
C614	N/F	470U 16V	1000U 16V	470UF 16V	470UF 16V	N/F
C621	470U YXB	100U 16V	100U 16V	470U YXB	100U 16V	470U YXB
D607	SRP100B	RL2Z	RL3Z	BYT53F	RL3Z	SRP100B
D609	SRP100G	BYT53F	S2L40	BYT53F	BYT53F	BYT53F
D611	SRP100G	SRP100D	RL2Z	BYT53F	RL2Z	SRP100D
D615	N/F	100R RES	SRP100G	N/F	SRP100G	N/F
R611	2K7	3K0	3K0	3K0	3K0 #	3K0
R614	1K0	1K1	1K1	1K0	1K1	1K0
R618	N/F	100PF CAP	3R3	N/F	12	N/F
R619	N/F	1K5 1/2W	820 1W	N/F	N/F	N/F

USE 2K7 FOR SR950 MK1 ONLY



DRG.No.
3401-017E-5B
ISSUE

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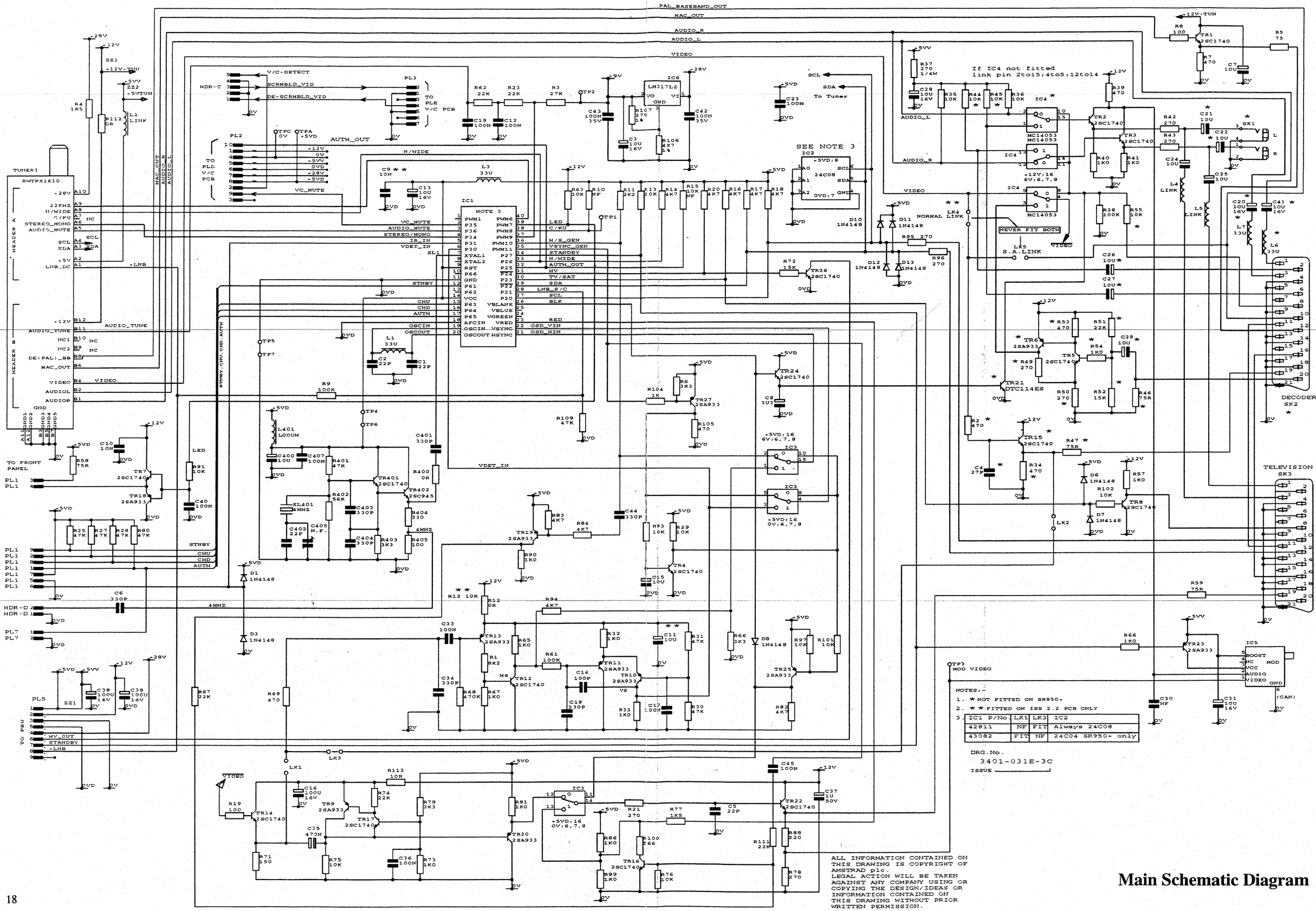


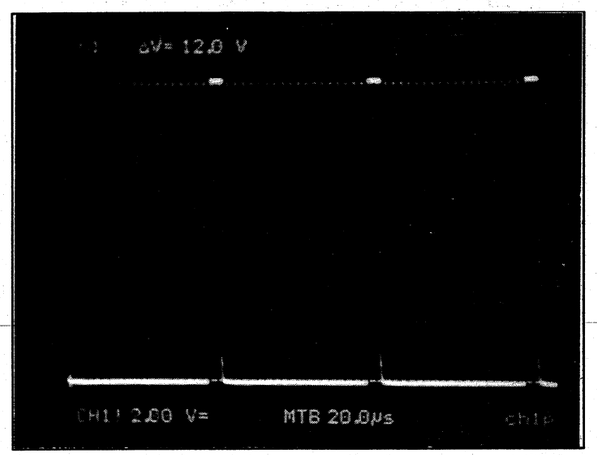
NOTES:-

1. ★ NOT FITTED ON SR950+
2. ★★ FITTED ON ISS 2.2 PCB ONLY
3.

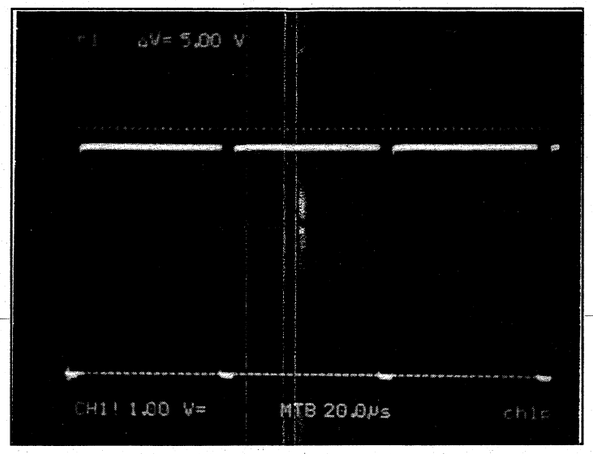
IC1 P/No.	LK1	LK3	IC2
42811	NF	FIT	Always 24C08
43082	FIT	NF	24C04 SR950+ only

Main Schematic Diagram

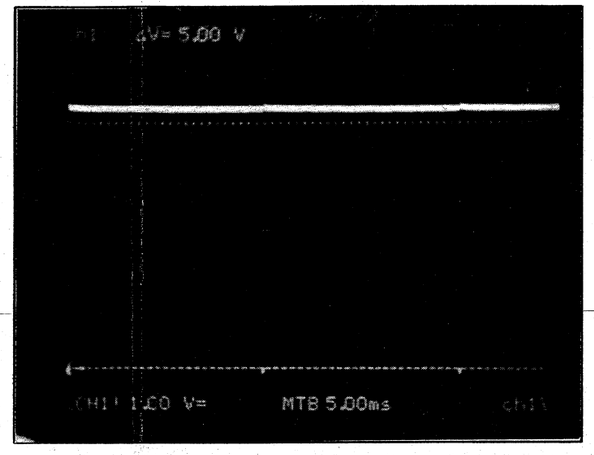
TEST POINT OSCILLOGRAMS



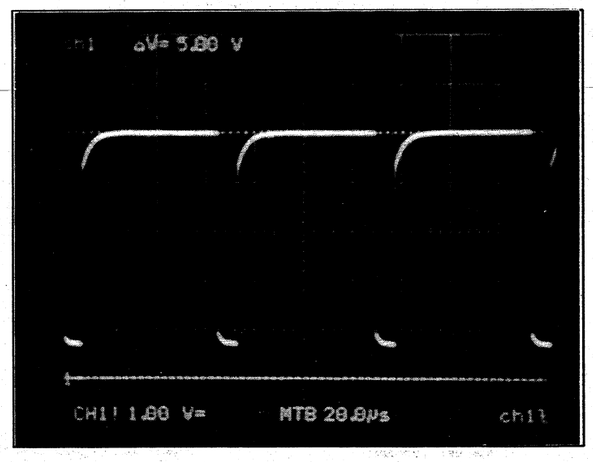
Ref. 4c: TP TR13 Collector



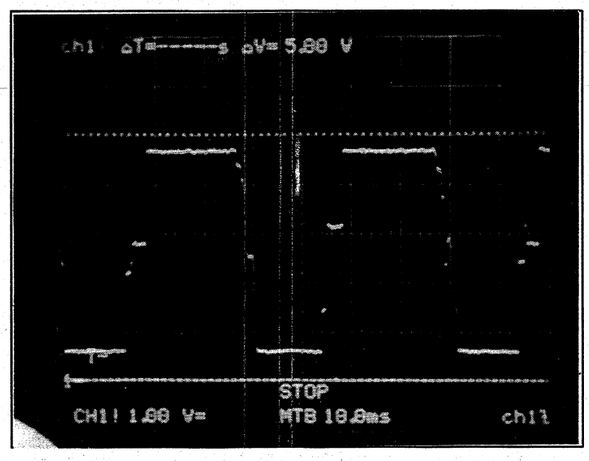
Ref. 4e:TP IC3 Pin 13



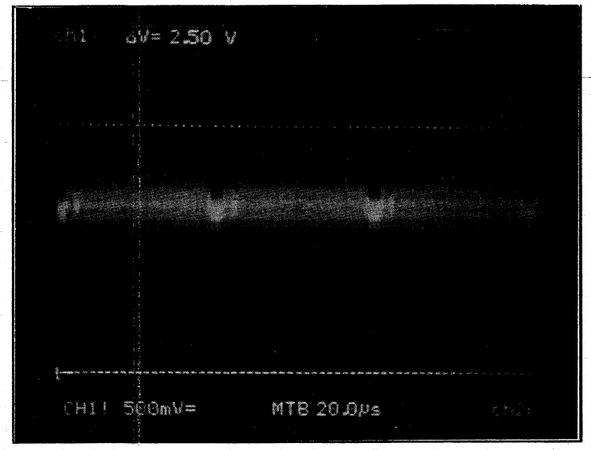
Ref. 4h: TP TR10 Collector



Ref. 9d: TP IC1 Pin 36

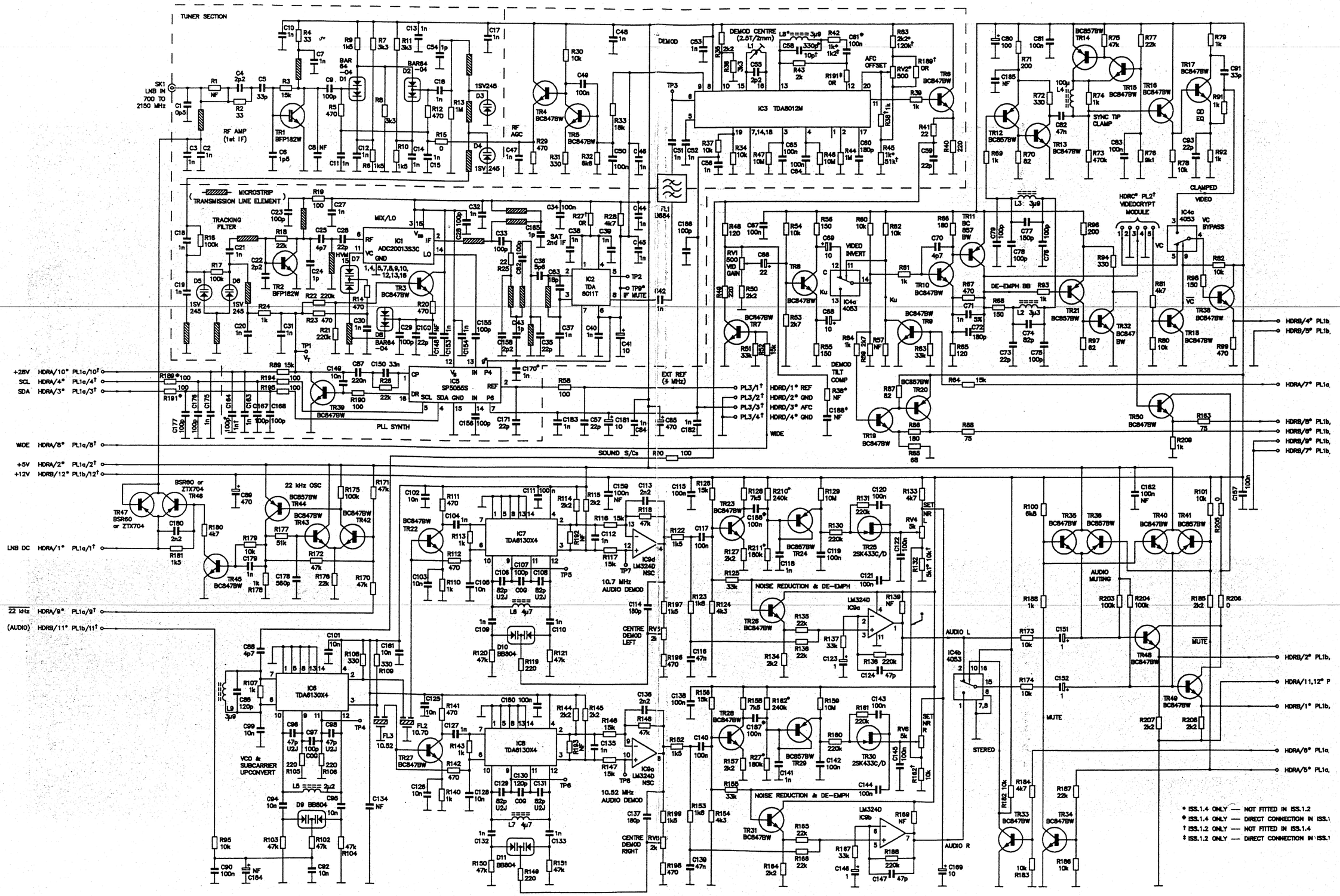


Ref. 11h: TP PL1B Pin 8



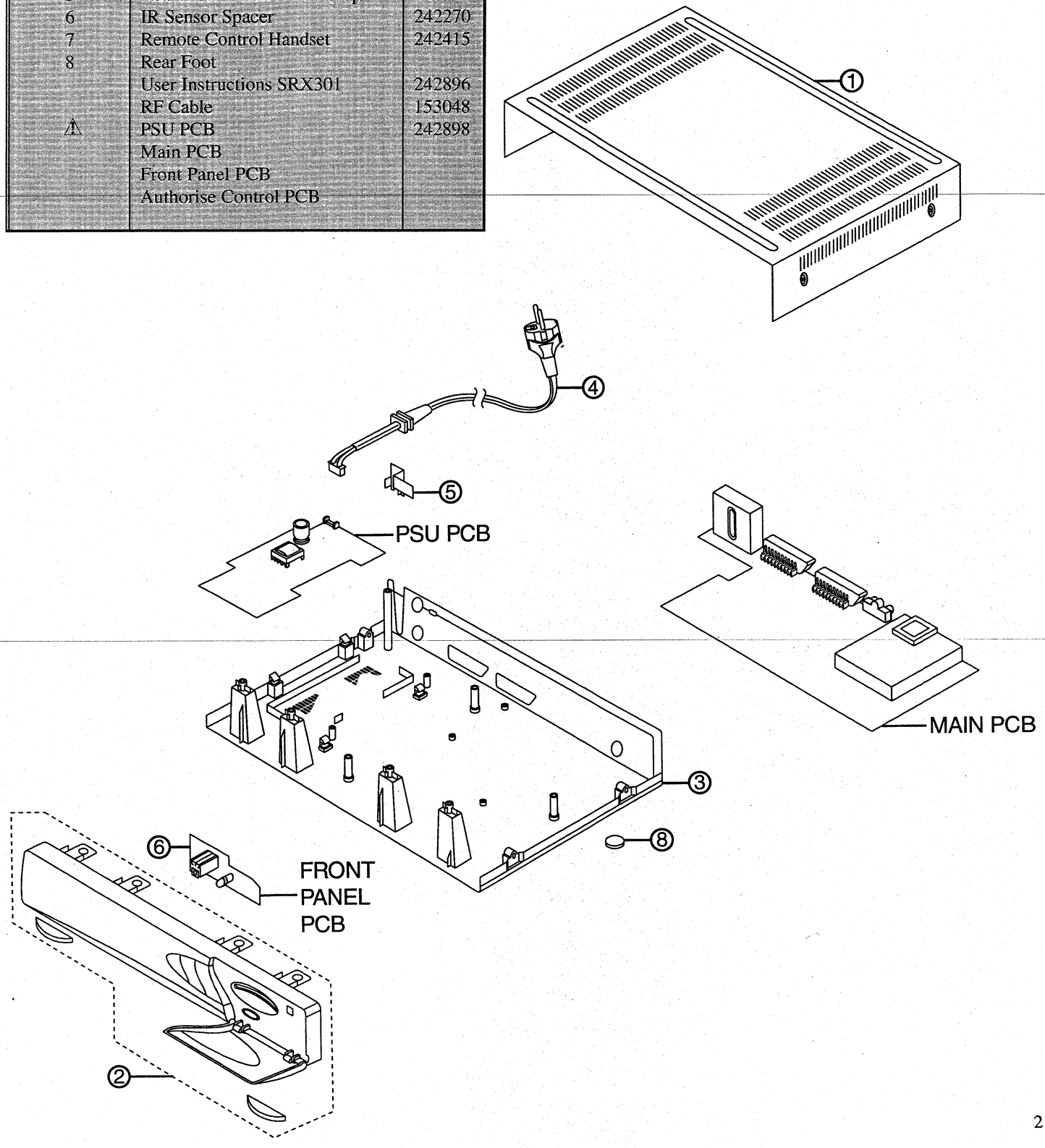
Ref. 13d: TP VR1

Tuner Schematic Diagram



SRX301 Cabint Parts List

Ref. No.	Description	Pt. No.
1	Top Cabinet	242155
2	Front Panel Assy SRX301	242892
	Rubber Foot (Part Of Front Panel)	
	Flap Front Panel SRX301	242894
3	Bottom Cabinet	
4 ⚠	Mains Lead	240861
5	Rear Insert Mains Lead Stop	240741
6	IR Sensor Spacer	242270
7	Remote Control Handset	242415
8	Rear Foot	
	User Instructions SRX301	242896
	RF Cable	153048
⚠	PSU PCB	242898
	Main PCB	
	Front Panel PCB	
	Authorise Control PCB	



Electrical Parts List

Ref. No.	Description	Pt. No.
	ICs	
IC1	IC Z86227 CPU	242410
IC1 FP	IC RPM638CBRS IR Sensor	242812
IC2	IC CAT24C08	242890
IC3	IC TC74HC4053AP	242413
IC4	IC MC14053	242412
IC5	RF Modulator PAL-G CH30-40	242902
IC6	IC LM317LZ Regulator	242807
IC600	IC CNY17F3XG Opto Coupler	242458
IC601	IC TL431CLP Shunt Regulator	242455
IC602	IC LM2574N-ADJ AMS42577	242456
IC604 ⚠	IC TOP202VA SMPS Control	242457
	Transistors	
TR1-5,7,8 12,14-17,20 26,401,402	Tr 2SC1740 S-R	50016
TR6,9-11 13,18-20 23,25,27	Tr2SA933 S-R / 2SA608 / 733K	204154
	Diodes	
D606	D BAT42	242450
D1,3,6-8, 10-13,400 401,604	D 1N4148	270754
D601 ⚠	D DF10M Bridge	241403
D602	DZ BZV47C200	242431
D603 ⚠	D SRP100K	242447
D606	D AK03 Schottky	254944
D607,609	D BYT53F	242667
D611	D SRP100D	242430
	Coils	
L1,3,LK near R45,401	Coil 33µH	
L601	Coil Line Filter UU9LF-B103	242454
L602	Coil Choke RCR110D-102LY	242453
L603	Coil 33µH 2A	242452
T600 ⚠	Tx Mains Switch Mode 20W LLP100TH	242436
	Miscellaneous	
FS600 ⚠	Fuse T1.25A 250V	240083
SK1	Phono Socket Twin	242437
SK2,3	Scart Socket Female 21 PIN	153030
SW1-4	Tact Switch 4P Alps	242414
Tuner1	Tuner Assy RWT1635	242842
VR600	VRSF 2.2k ohm	
XTL1	Crystal 4MHz	242407
	Set Poly Packing	242819
	Carton SRX301	242899

Description	Ref. No.	Pt. No.
	Resistors 1/6W	
1.5 Ω	R4, Between IC603 Pin1 & 3	
10 Ω	R113,616	
27 Ω	R3	
47 Ω	R605,607	
75 Ω	R5,46,47,58,59,405	
100 Ω	R8,19	
150 Ω	R71	
220 Ω	R88	
270 Ω	R21,42,43,49,50, 78,95 96,404	
270 Ω 1%	R107	
470 Ω	R613, bet TPA & PDA of R79 nearTPA	
560 Ω	R100	
1k Ω	R32,33,40,41,54,57,60,65,67,73 81,86,90,99,104,609,612,614 617,bet Base of 2SC1740 & Pin11 of IC3	
1.1k Ω 1%	R614	
1.5k Ω	R77	
1.8k Ω 1%	R108	
2.2k Ω	R11	
3k Ω	R611	
3.3k Ω	R6,66,403	
4.7k Ω	R14,16-18,20,82-84,94	
8.2k Ω	R1	
10k Ω	R13,29,35,36,44,45 55,63,75,76,91,93,97,101 102,608	
15k Ω	R52,72	
22k Ω	R23,51,62,74,87,111	
47k Ω	R25,27,28,30,31,80,401	
56k Ω	R402	
100k Ω	R38,61,D2	
470k Ω	R68	
	Resistors 1/4W Unless Std Differently	
100 Ω	R1,616	
270 Ω	R37	
3.9k Ω	R615	
1M Ω	R602	
6.8 Ω ½W	R bet IC603 Pin 1&3	
1k Ω 1W	R606	

Description	Ref. No.	Pt. No.
	Capacitors	
	Electrolytic	
1µF 50V	C15,37	
4.7µF 50V	C617	
10µF 16V	C3,7,13,20-22,24-29,31,41,406	
22µF 25V	C603	
47µF 400V ⚠	C605	242443
100µF 16V	C1,16,38,39,606	
100µF 25V	C616,621	
220µF 35V	C610	
470µF 10V	C619	
470µF 16V	C614	
1000µF 10V	C613	
	Ceramic	
22PF	C1,2,4,5,402	
33PF 1kV⚠	C604	242
100pF	C Bet Pin1 & 5 of SK2	
330PF	C6,18,34,44,401,403,404	
470pF 1kV ⚠	C602	
0.0022µF⚠	C608	242439
0.1µF	C12,17,19,23,33,36,40,45,407 607,609,624	
	Poly	
0.1µF	C42,43	
0.22µF	C612	
0.47µF	C35	

Description	Ref. No.	Pt. No.
	Metal Film	
0.01µF ⚠	C600	240484

Amstrad reserves the right to supply selective components.